SUMMARY OF THE
U.S. NUCLEAR REGULATORY COMMISSION/U.S. DEPARTMENT OF ENERGY
TECHNICAL EXCHANGE ON THE IDENTIFICATION OF SYSTEMS,
STRUCTURES, AND COMPONENTS IMPORTANT TO SAFETY
LAS VEGAS, NEVADA
MAY 12, 2004

Introduction

On May 12, 2004, the U.S. Nuclear Regulatory Commission (NRC) and the U.S. Department of Energy (DOE) held a public technical exchange to discuss DOE's methodology for identifying structures, systems, and components (SSCs) important to safety (ITS), at the Bechtel SAIC offices in Las Vegas, Nevada. The agenda for this meeting can be found in Attachment 1.

To support staff and stakeholder interactions, the technical exchange included video connections at NRC offices in Rockville, Maryland, and the Center for Nuclear Waste Regulatory Analyses (CNWRA) in San Antonio, Texas. Telephone audio connections were also made available to stakeholders.

Participants included representatives of the NRC, DOE, CNWRA, Naval Nuclear Propulsion Program, Nuclear Energy Institute, and members of the public. Attachment 2 contains the list of attendees who were present at the above noted locations. The presentations are included in Attachment 3.

Opening Remarks

NRC stated that the purpose of the meeting was to allow DOE to present its methodology for identifying SSCs that are important to safety during the operations of the geologic repository operations area (GROA). When an SSC is designated as ITS then DOE must control it in accordance with the quality assurance program as described in 10 CFR Part 63, Subpart G. NRC will also review other SSCs (e.g., fire protection) and applicable programs that will be required for the safe operation of the GROA (e.g., radiological control program and emergency plan). The GROA includes all the SSCs that are required to receive, process, and emplace high level waste into the potential geologic repository at Yucca Mountain.

The DOE stated that this technical exchange had been scheduled to follow-up on several questions raised by NRC during the February 2004 technical exchange on the level of detail that DOE will supply in the potential license application. Specifically, the NRC staff did not have a clear understanding of the process and criteria used by DOE to classify and document SSCs as ITS and not ITS. In addition, it was not clear how DOE evaluated the potential for items that are classified as not ITS to affect items that are ITS. At that time, the NRC recommended a public meeting be conducted with DOE to clarify concerns raised in this area. The DOE noted that, at this time, the preclosure safety analysis has not yet been completed; therefore, only examples of how DOE applied its methodology to identify SSCs as ITS would be provided during this technical exchange. The examples should not be considered DOE commitments.

Presentation and Discussion

The presentation included discussions on:

- The DOE's Methodology for Identifying SSCs as ITS;

ENCLOSURE

- Examples of the Classification of SSCs as ITS; and
- Documentation in the Safety Analysis Report of SSCs that are ITS.

The DOE'S Methodology for Identifying SSCs as ITS

The DOE began its presentation with an overview of requirements of 10 CFR Part 63 that applied to the identification of SSCs as ITS to help outline how DOE developed its methodology. Next, DOE described its interpretation of the difference between normal operations and Category 1 event sequences as described in 10 CFR Part 63. In summary, normal operations are activities that will not lead to unplanned worker or public dose; Category 1 event sequences are off-normal occurrences that are distinct from normal operations. In addition, a Category 1 or Category 2 event sequence ends once SSCs have been placed in a stable condition (e.g., dose limits are returned below the regulatory limits) and recovery operations have begun.

An SSC would be identified as ITS if its function is credited for prevention or mitigation of the consequences of a Category 1 or Category 2 event sequence. The entire SSC may be identified as ITS; however, only those elements of the SSC that are required to prevent or mitigate the event sequence would be controlled in accordance with the DOE's quality assurance program.

An overview was provided of the relation between the Yucca Mountain site and the dose requirements of 10 CFR Part 20 and Part 63 (see Attachment 3, slides 9-11).

The DOE noted that, in accordance with 10 CFR 63.111, the potential individual worker dose received from the aggregate of Category 1 event sequences would not exceed the requirements of 10 CFR Part 20 of 5 rem/year. The DOE clarified that the actual dose allowed to workers from all normal operations and Category 1 event sequences that occurred in any year would not exceed 10 CFR Part 20 requirements of 5 rem/year. The NRC agreed with this position.

Examples of the Classification of SSCs as ITS

The DOE presented several examples of how it will classify SSCs as ITS. The following is a summary of the examples and any NRC questions and concerns raised during the meeting.

- **Radiation Monitors:** If a radiation monitor is used to provide an alarm that is credited to alert an operator to take action or to actuate a design feature for the mitigation of a Category 1 or Category 2 event sequence then it will be classified as ITS. All other radiation monitor functions are not considered ITS. The NRC did not identify any questions or concerns with this example.

- **Shield Walls:** If the shield wall is used to limit worker dose from a Category 1 event sequence then it is classified as ITS. If the wall is only used to limit worker radiation dose during normal operations then it is not ITS. In addition, some shielding walls that are not classified as ITS for worker shielding during a Category 1 events sequence may be classified as ITS for structural reasons (e.g. supporting a fuel handling crane). The

NRC noted that DOE should assess configuration control requirements for maintenance of SSCs that are not ITS (e.g., shield walls) but if performed improperly could result in an over exposure of a worker. Therefore, SSCs that are removed or modified to conduct maintenance activities may need to be subject to rigorous configuration control. Further, in determining whether SSCs should be ITS, DOE should consider human induced error as an initiating event.

- **Radiation Protection Program:** Radiation protection program consumables (e.g., personnel dosimetry and portable shielding) and SSCs designed to limit worker radiation doses during normal operations (e.g., reach rods and manipulators) are not classified as ITS. The NRC did not identify any questions or concerns with this example.

- **Ventilation Systems:** If ventilation SSCs (e.g., dampers, fans, and ducts) and other support system SSCs (e.g., power supplies) are required to limit worker or public dose from a Category 1 event sequence then it is classified as ITS. The NRC did not identify any questions or concerns with this example.

- **Spent Nuclear Fuel Assembly (SNF) and Unsealed and Sealed Waste Package (WP) Drops:** The SSCs used to prevent or mitigate the dose consequences of a dropped spent nuclear fuel assembly or unsealed waste package would be classified as ITS. These include portions of the ventilation system, lifting cranes and associated equipment, and impact limiters. In addition, lift height restrictions would be applied when possible in making SNF and WP movements. The NRC did not identify any questions or concerns with this example.

- **Emplacement Drift and Ground Support Systems:** The emplacement drift and ground support systems have four functions: (1) access for emplacement, (2) access for performance confirmation, (3) access for retrieval, and (4) flowpath for preclosure ventilation. The DOE stated that the WP was capable of withstanding the force of a degrading drift and that the protection of the WP from a design basis rockfall (a single rock between 1.2 and 6.5 metric tons, or dual rocks totaling 6.0 metric tons) is not a function of the ground support system. Therefore, the ground support systems are not classified as ITS. The NRC expressed concerns about access in the drifts for maintenance and retrieval activities. The DOE replied emplacement drift and ground support system are expected to perform for the conditions that are expected for the duration of the preclosure operation. Small rocks, not boulders, are expected to fall (this should not be confused with the design basis rockfall noted above). Retrieval is not an immediate concern and there will be adequate time to assess conditions and develop plans.

- **Emplacement and Retrieval Equipment:** There are three major components used for the emplacement and retrieval WPs.

  - Waste Package Transporter: The transporter is considered ITS for the following functions: (1) protection from rockfall in the main access tunnels where rockfall size may exceed the design basis rockfall for the WP, (2) limitation of the waste package drops and drip height, (3) the airbrake system and coupler that prevents runaway of the transporter.

- Transport Locomotive: The locomotive is considered ITS because the braking system, coupler, and speed limiter prevent runaway of the locomotive and transporter.

- Emplacement Gantry: The gantry is ITS because it has interlocks and control systems to ensure proper sequencing of operations of transporter cars and it prevents a beyond design basis drop of a WP.

The NRC did not identify any questions or concerns with this example.

Documentation in the Safety Analysis Report of SSCs that are ITS The DOE provided an overview of how SSCs will be described in the safety analysis report (SAR). The DOE stated that the license application (LA) will contain sufficient detail to describe the repository so that NRC will understand how it operates. The process used by DOE to identify SCCs and their functions classified as ITS will be described in the SAR. The SSCs and their functions classified as ITS will be described in more detail than non-ITS SCCs; however, both will be discussed in the LA. The LA will include descriptions of the operational flow process of the GROA and line diagrams of supporting systems (e.g., electrical system), will be provided. The DOE will provide general specifications of some SSCs (e.g., waste package transporter and emplacement gantry) in the SAR but not specific designs. Those specifications described in the SAR, including reliability requirements when applicable, will be requirements in procurement documents. The vendor and DOE will be responsible for demonstrating that those specifications have been met; this may be the subject of an NRC inspection.

Stakeholder Comments and Questions

The following are comments from the public received before the lunch break:

- Ms. Sally Devlin stated that the Yucca Mountain Project (YMP) was not a project limited to the present. It is a hundred year project. She also indicated that classified Department of Defense SNF and HLW should not be allowed in Yucca Mountain.

- Ms. Judy Treichel from the Nevada Nuclear Waste Task Force had three questions for the meeting attendees. First, how large are each of the colored areas on the site area map (Figure 1). The DOE responded that the preclosure compliance point identified on the map was 11 kilometers from the GROA. Second, what type of case is coming through the door shown on the drawing of the Canister Handling Facility (Appendix 3, slide 17). The DOE responded that the cask was a transportation cask shipped by rail or truck. Third, what does "MSC" mean as used to identify a particular type of cask. The DOE responded that "MSC" signifies "monitored-geologic repository site-specific cask."

- Mr. Grant Hudlow stated that regulations required three safety plans for licensing Yucca Mountain, but a few months ago, DOE has only committed to providing the plans after licensing. Mr. Hudlow was concerned that DOE has no nuclear culture and NRC is not used to working with applicants without nuclear culture. In addition, the Yucca Mountain "mine" is built in unstable rock formations and is very dangerous. NRC and DOE are not experienced in mining or metallurgy including the attack of micro-organisms on the WP.

Different project reports indicate different opinions on technical issues. Mr. Hudlow stated that with the exception of John Arthur, project personnel evaluating technical issues are not knowledgeable. NRC staff responded to Mr. Hudlow's comments by stating that the NRC and the CNWRA have the extensive technical experience required to evaluate the licensing of Yucca Mountain.

The following are comments received from the public at the end of the meeting:

1. Mr. Grant Hudlow questioned what DOE plans to do about off-gassing. Mr. Hudlow stated that the DOE does not have project personnel with sufficient technical experience. He indicated that there was no system to find the proper people to work on this project. In addition, according to some politicians, YMP will run out of funding since nuclear plants are shutting down. Mr. Hudlow expressed concern that Paul Craig resigned from the Nuclear Waste Technical Review Board due to his concerns on the WP. The NRC staff responded to Mr. Hudlow stating that the Atomic Safety and Licensing Board hearing is one method to record his concerns.

2. Ms. Sally Devlin asked if anyone in the room was aware of the "Federal Facility Agreement and Compliance Order Agreement." Ms. Devlin also questioned where the DOE was going to get all the water needed for the wet remediation in the dry transfer facility. She also indicated that the canister and drip shields would not work because the "bugs" will eat through them. In closing, Ms. Devlin informed the meeting attendees that the surveys for the maps of Nevada are all outdated and need to be revised and that there is no established boundary between California, Nevada, and the various counties.

SUMMARY AND FOLLOW-UP ACTIONS

In conclusion, NRC stated that the DOE's methodology for identifying and classifying SSCs as ITS appears to be appropriate. The DOE addressed the concerns that NRC raised at the level of detail technical Exchange in February 2004. NRC requested that a technical exchange be conducted on the final design of the GROA that includes examples of the final classification of SSCs that are ITS, during the late summer 2004. At least some of the examples should be similar to those presented during this technical exchange.

Date 6/17/04

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